Remarks/Arguments:

Applicants' disclosure is directed to a laser apparatus. The laser apparatus includes a laser light source and a bulk type optical wavelength converter. A single mode fiber connects the laser light source and the optical wavelength converter such that the single mode fiber conveys laser light from the laser light source to the optical wavelength converter. This construction allows for the laser light source to be located remotely from the optical wavelength converter to reduce variation in temperature of the optical wavelength converter due to heat generated by the laser light source.

Claims 78, 80, 87 and 89 stand rejected under 35 U.S.C. § 103(a) as obvious over Asami et al. (U.s. Patent No. 5,415,978) and Gupta (U.S. Patent no. 5,682,398). Claims 81 and 90 stand rejected under 35 U.S.C. § 103(a) as obvious over Asami and Nitta (5,590,145).

Asami discloses a semiconductor laser 102 and a KTP crystal 110. According to Asami, output from the semiconductor laser 102 is propagated through a lens 104 to the KTP crystal 110.

Gupta discloses locking the wavelength of a semiconductor laser (see col. 2, lines 48-59). Further, Gupta discloses, in Fig. 1, an optical fiber 20 disposed between a frequency doubled crystal 22 and a laser 12. According to Gupta, the optical fiber 20 is used to convey the output of the laser 12 so as to reduce, as much as possible, the variation in the frequency of the output of the laser 12 (See column 3, lines 4-10).

Applicants' invention, as recited by claim 78, includes features which are neither disclosed nor suggested by the art of record, namely:

> ...a single mode fiber for conveying laser light from the semiconductor laser to the optical wavelength conversion element...
>
> ...wherein the single mode fiber is configured to prevent a variation in temperature of the optical wavelength conversion element caused by a heat generated from the semiconductor laser, the semiconductor laser being remote from the optical wavelength conversion element.

In the exemplary embodiment described in Applicants' disclosure, this means that the optical wavelength conversion element and the laser are located remotely from each other. However, the laser is still able to convey light to the wavelength conversion element via a single mode fiber, which connects them. Remotely locating the wavelength conversion element from the laser prevents variation in temperature of the wavelength conversion element due to heat generated from the laser. This feature is found in the originally filed application at page 55, lines 15-19. No new matter has been added.

Asami discloses a semiconductor laser 102 and a KTP crystal 110. Output from the semiconductor laser 102 is propagated through a lens 104 to the KTP crystal 110. Examiner admits that Asami does not disclose a single mode fiber for conveying laser light from the semiconductor laser to the optical wavelength conversion element, as required by claim 78. Similarly, Asami does not disclose "the single mode fiber is configured to prevent a variation in temperature of the optical wavelength conversion element caused by a heat generated from the semiconductor laser, the semiconductor laser being remote from the optical wavelength conversion element," as required by claim 78.

Gupta discloses a frequency conversion laser device. As shown in Fig. 2, the device relevantly includes single mode fiber 20, which propagates light from laser diode 12 to frequency doubled crystal 22. The device further includes mount thermoelectric cooler 24. Mount thermoelectric cooler 24 is included to control the temperature of laser 12 and frequency doubled crystal 22. The optical fiber prevents the light beam from diverging over the length of optical fiber 20. The frequency doubled-crystal may also be a waveguide structure. "It is particularly effective to use such a waveguide structure with optical fibers so they can be made of small dimensions <u>and single mode optical fibers can be sized to be compatible</u> with a waveguide structure so that efficient coupling can be achieved." See column 3, lines 59-64.

It is apparent from Gupta that Gupta's optical fiber is not included to prevent a variation in temperature of the optical wavelength conversion element caused by a heat generated from the semiconductor laser. In fact, the length of Gupta's optical fiber may be dictated by the waveguide structure used as the frequency doubled

device. Further, Gupta includes a thermoelectric cooler to control the temperature of the frequency doubled device. The thermoelectric cooler would not be necessary if the optical fiber were long enough to remotely locate the laser from the frequency doubled device so as to prevent a variation in temperature of the optical wavelength conversion element. Accordingly, Gupta does not disclose at least that "the single mode fiber is configured to prevent a variation in temperature of the optical wavelength conversion element caused by a heat generated from the semiconductor laser, the semiconductor laser being remote from the optical wavelength conversion element," as required by amended claim 78.

Further, it would not be obvious to combine Gupta with Asami for several reasons. First, the combination would not work. As described above, Gupta's fiber is not long enough to remotely dispose the laser far enough from the KTP crystal to prevent temperature variations in the KTP crystal. Also, it would not be obvious to combine Gupta's fiber with Asami's laser and KTP crystal to prevent temperature variations in the KTP crystal because Gupta uses a thermoelectric cooler to prevent temperature variations in its conversion device. Accordingly, one of ordinary skill in the art would not think to use Gupta's fiber to prevent temperature variations in Assami's KTP crystal.

It is <u>because</u> Applicants include the feature of a single mode fiber for conveying laser light from the semiconductor laser to the optical wavelength conversion element, wherein the single mode fiber is configured to prevent a variation in temperature of the optical wavelength conversion element caused by a heat generated from the semiconductor laser, the semiconductor laser being remote from the optical wavelength conversion element, that the following advantages are achieved. Namely, the laser can be disposed far enough away from the optical wavelength conversion element that heat generated by the laser does not effect the temperature of the optical wavelength conversion element. Using this configuration, no added thermoelectric cooler is necessary.

Accordingly, for the reasons set forth above, claim 78 is patentable over the art of record.

Claim 87, while not identical to claim 78, includes feature similar to claim 78. Accordingly, claim 87 is also patentable over the art for the reasons set forth above.

Claim 81 includes all the features of claim 78 from which it depends and claims 89, 90, 92, 93 and 97 include all the features of claim 87 from which they depend. Thus, claims 81, 89, 90, 92, 93 and 97 are also patentable over the art of record for the reasons set forth above.

Claims 99 and 100 are newly added and are respectively supported by the specification at page 66, lines 15-17. Specifically, as described at page 66, lines 15-17, "it is no longer necessary to provide a special heat release structure for a semiconductor laser." No new matter has been added.

New claims 99 and 100 include a feature which is neither disclosed nor suggested by the art of record, namely:

the semiconductor laser is fixed in a housing without active cooling.

This means that the semiconductor laser does not include any added cooling element. This feature is found in the originally filed application at page 66, lines 15-17. No new matter has been added.

Referring to Fig. 1 of Gupta, Gupta discloses a laser device that includes fiber 20 that conveys light between laser diode 12 and frequency doubled crystal 22. Laser diode 12 is mounted on mount 14 and thermoelectric cooler 16. Frequency doubled crystal 22 is mounted on mount thermoelectric cooler 24.

This is different because Applicants' laser device, as claimed in claims 99 and 100, is fixed in a housing without active cooling. As shown in Fig. 24, Applicants' laser device relevantly includes fiber 20 for conveying light between semiconductor laser 20 and conversion element 25. Accordingly, because Gupta discloses use of thermoelectric coolers 16 and 24 to cool the laser, Gupta is not "without active cooling."

It is <u>because</u> Applicants include the feature of the semiconductor laser "without active cooling" that the following advantages are achieved. Namely, Applicants' laser does not require use of bulky cooling elements to cool the laser. Accordingly, Applicants' laser can be made significantly smaller.

Accordingly, for the reasons set forth above, claims 99 and 100 are patentable over the art of record.

Claims 78 and 87 have been amended to remove any alleged indefiniteness. Claim 81 depends from claim 78 and claims 89, 90, 92, 93 and 97 depend from claim 87 and, therefore, are not indefinite. These claims are all compliant with 35 U.S.C. § 112. Withdrawal of this rejection is respectfully requested.

In view of the amendments and arguments set forth above, the above-identified application is in condition for allowance which action is respectfully requested.

Respectfully submitted,

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